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EXAMINER
SHINGLETON, MICHAEL B

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2817	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09-610,933	Applicant(s) Raab
	Examiner SHINGLETON	Group Art Unit 2817

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE Three MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

☒ Responsive to communication(s) filed on 5-18-2003.

☐ This action is FINAL.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 1 1; 453 O.G. 213.

Disposition of Claims

☒ Claim(s) 1-61 are pending in the application.

Of the above claim(s) 10-12, 20-27, 47-55 is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 1-9, 13-19, 28, 30-34, 37, 38, 40-46, 56-61 are rejected.

☒ Claim(s) 29, 35, 36, 39 are objected to.

☐ Claim(s) _____ are subject to restriction or election requirement

Application Papers

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119 (a)-(d).

☐ All ☐ Some* ☐ None of the:

☐ Certified copies of the priority documents have been received.

☐ Certified copies of the priority documents have been received in Application No. _____.

☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a))

*Certified copies not received: _____.

Attachment(s)

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☒ Interview Summary, PTO-413

☒ Notice of Reference(s) Cited, PTO-892

☐ Notice of Informal Patent Application, PTO-152

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Other _____

Office Action Summary

DETAILED ACTION

Claim Rejections - 35 USC § 112

Claim 17 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 17 recites that the electronically tunable capacitor is a micro electro-mechanical device. This puts claim 17 is direct contradiction with base claim 1 in that base claim 1 recites the tunable reactive component is "non-mechanical" whereas the electro-mechanical device is clearly mechanical. This makes what is being claimed indeterminate. However, for examining purposes in order to further the prosecution of the instant application, it will be assumed that claim 1 as claim 17 depends upon includes reactive components that are mechanical as well.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5, 13, 15, 16, 28, 37, 40, and 56-60 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Dent 5,423,074 (Dent).

Figures 2 and 3 of Dent disclose an electronically tuned circuit having a means for power amplifying in the form of a power amplifier 21. The means for power amplifying 21 inherently is capable of being operated in a large signal mode and inherently operates in a large signal mode because as recognized by Dent this means 21 is a power amplifier used in a transmitter. Transmitters inherently operate in the large signal mode as is commonly known in the art. Figures 2 and 3 of Dent clearly shows the means of power amplifying 21 is connected to means for electronic tuning, also called "an electronically tunable output network" or just "output network" by the claims. Note specifically elements 32, 30, 42 and 44. This output network of Dent has a tuning input (line applied to input of the switching elements or the varactor as noted below.), input and output terminals (Clearly illustrated in Dent, as all filter networks have an input and an output.), and an electronically tunable reactive component. The reactance 42 in combination with the switch, the reactive element 74 in combination with the switch 76,

the use of a varactor in place of elements 74 and 76 all form an electronically tunable reactive component as meant by the claims (See column 5, lines 1-38). Also note just like the fixed reactance 74 switched in and out of the circuit forms a variable reactance element, i.e. variable capacitance, the inductor 42 that is switched in and out of the circuit forms a variable inductance in the circuit. The varactor, the fixed reactance in combination with a switch and the inductor in combination with a switch of Dent are all reactive devices that do not employ a mechanical means of electronic tuning. The tuning is controlled by a signal applied to the switching elements 76 or 44, or as applied to the varactor. The output network of Dent is adapted by the value of variable reactance to be tuned to a selected frequency. Element 32 of Dent not only forms a harmonic filtering function (See column 5, line 15) but is also an "matching network" that clearly makes this structure "adapted to be adjusted to match a selected load impedance." As the device of Dent utilizes a modulated RF signal to be transmitted this modulated signal passes through the output network and thus the output network is inherently adapted to produce a modulated signal at the network output. Also note that since the output network filters and changes the signal the output signal is considered as having been "modulated". As noted above the matching network matches and thus this inherently provides for a power amplifier load impedance locus that substantially maximizes power amplifier efficiency. The whole idea of impedance matching to minimizes reflections, i.e. deliver the maximum power to the load that in turn maximizes power amplifier efficiency. The electronically tunable varactor is an electronically tunable capacitor and it is a diode. The varactor has a control terminal for as is well known in the art controlling the voltage applied to the varactor controls the capacitance thereof. Note that Figures 2 and 4 of Dent clearly shows the application of the bias voltage (power supply) to the power amplifier 21. This forms the "bias input for setting bias level of said power amplifier". Dent in column 5, around line 32 recites that the control line may be connected to "a suitable control device for automatic control." Thus Dent discloses the use of a controller for providing a signal for controlling the electronically tunable output network. Also note that the output network also includes at least two reactive components, for example the varactor as noted above and the capacitor 60. Also as noted above the varactor is electronically tuned by a tuning signal.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be

patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 6-9, 14, 17-19, 31, 32, 38, 41-46, and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dent 5,423,074 (Dent).

All the above reasoning as applied to claims 1-5, 13, 15, 16, 28, 37, 40, and 56-60 above and the following: Dent specifically recites that the switch 76 used in combination with the fixed reactance 74, that can be capacitor (See Figure 3), can be an electronic switch, however, Dent is silent on this electronic switch being a transistor. A transistor is a well-known form of electronic switch.

Accordingly it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a transistor as part of the tunable capacitor arrangement since the examiner takes Official Notice of the equivalence of the transistor (electronic switch) and the electronic switch 76 for their use in the amplifier and switching art and the selection of any of these known equivalents to switch would be within the level of ordinary skill in the art.

Dent specifically recites that a varactor can form the variable capacitance element, however, Dent is silent on this variable capacitance element being a micro electro-mechanical system device, or a variable-dielectric material tunable capacitor device, or a piezo-electric tunable capacitor device. A micro electro-mechanical system device, a variable-dielectric material tunable capacitor device and a piezo-electric tunable capacitor device are well-known forms of variable capacitance element.

Accordingly it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a micro electro-mechanical system device, or a variable-dielectric material tunable capacitor device, or a piezo-electric tunable capacitor device as the variable capacitance element in Dent since the examiner takes Official Notice of the equivalence of the micro electro-mechanical system device, the variable-dielectric material tunable capacitor device, or a piezo-electric tunable capacitor device to the varactor for their use in the amplifier and variable reactance art and the selection of any of these known equivalents to vary capacitance would be within the level of ordinary skill in the art.

Dent does not specify exactly what bias voltage level the arrangement is set at. However, the selection of the bias level merely selects the class of operation and is merely the selection of the optimum or workable range. For example selecting the bias voltage for class A operation results in linear operation but at a large loss in efficiency. Other bias points select other classes of operation which may not be as linear as class A but have greater efficiency like for example class E operation. These selections are all part of the optimum or workable range for an amplifier that involves but routine skill in the art.

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select the bias point to be one that enables "minimum operation" thereby reducing power consumption or to be that of class E operation since this merely involves the selection of the optimum or workable range that involves but routine skill in the art and since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art (See In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980)).

Dent does not specify that the output network be further adapted to follow a substantially resistive power-amplifier impedance locus, thereby maintaining power amplifier efficiency near maximum. However, this selection is merely the selection of the optimum or workable range. Note the words "maximum" and "efficiency". Also note that the output network 32 of Dent is a matching element.

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select the operating point of the output network to follow a substantially resistive power-amplifier impedance locus thereby operating the network at optimum efficiency as admitted by applicant since this merely involves the selection of the optimum or workable range that involves but routine skill in the art and since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art (See In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980)).

Dent is silent on the use of a plurality of variable reactive elements to make up a single variable element. This is well-known in the art recognized equivalent to a single element and is well known to have the advantage of spreading the current over a plurality of elements which means that each individual element does not have to handle as much power as a single element.

Accordingly, it would have been obvious to one of ordinary skill in the art at the time of the invention to have substituted the conventional arrangement of a plurality of variable reactive components in place of the single variable reactive component of Dent because, the plurality of reactive elements forming a variable reactive element is and art recognized equivalent to the variable reactive device that employs but one variable reactive element and because the well-known reactive element that is composed of a plurality of reactive elements spreads the current over a plurality of reactive elements which means that the individual reactive element does not handle as much current and thus the current is spread over a plurality of elements. The set of "inputs" would be an obvious consequence of the invention made obvious above because each variable reactive element would have its own input even though these inputs maybe tied to a single input from a controller.

Dent does recite that a controller can be used to provide the control signal. Dent is silent on the use of a control system that employs a look-up table to provide the signal that is divided into the plurality of inputs when a variable reactive element composed of a plurality of variable reactive devices is used or to provide the signal to the single variable reactive device.

Nevertheless, as one of ordinary skill in the art would have known, controllers employing look-up tables are a well-known conventional form of controller.

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have substituted the conventional look-up table controller in place of the controller of Dent because, as the reference is silent as to the exact controller used, any art recognized equivalent controller would have been usable therewith such as the conventional look-up table controller.

Dent does recite that a controller can be used to provide the control signal. Dent is silent on the use of a control system that employs a digital signal processor referred to herein as DSP that is used to provide the control signal via a driver (controller as recited in the claims) for the output network and provides a drive signal to the power amplifier.

Nevertheless, as one of ordinary skill in the art would have known, controllers employing a DSP and related driving circuits like an D to A converter/buffer are a well-known conventional form of controller.

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have substituted the conventional DSP controller and its associated driver in place of the controller of Dent because, as the reference is silent as to the exact controller used, any art recognized equivalent controller would have been usable therewith such as the conventional DSP controller and its associated driver (controller). As to the use of DSP to also control the Power amplifier, DSP controllers are well-known to be used to set the gain etc. of the power amplifier as is conventional in the art. Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ a DSP controller so as to control and/or adjust the gain of the power amplifier since it is known in the art to utilize such controllers for such a purpose which allows for adjustment after the circuit has been made.

Dent is silent on operating at two different frequencies and adjusting the control signal accordingly while the amplifier is operation in class E operation. As noted above Dent discloses the controller for automatic control. Biasing to class E operation is merely the selection of the optimum or workable range that involves but routine skill in the art. The selection of what frequency to input is likewise merely the selection of the optimum or workable range. Thus it would have obvious to one of

ordinary skill in the art at the time the invention was made to select the operation frequency to be anywhere within the workable range as this involves but routine skill in the art and to select the optimum/workable range operation of the output network at this selected frequency so as to provide for efficient operation as this too involves but routine skill in the art. Note that Dent includes both fixed reactances like 62 and 30 and variable reactances like noted above. Selecting the optimum values is part of the selection of the optimum operation of the output network as noted above. Selecting the values to "suboptimum" class operation is the selection of the workable range of the output network as noted above.

Claims 30, 33, 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dent 5,423,074 (Dent) in further view of Hotta et al. 4,803,440 (Hotta).

All the same reasoning as applied in the above rejections of claims 1-9, 13-19, 28, 31, 32, 37, 38, 40-46, and 56-61 and the following: Dent does not show a "drive-level adjuster" applied to the input of the power amplifier so as to modulate the input signal which will in turn cause the power amplifier to produce a "modulated signal". A "drive level adjuster" is just another word to describe what is commonly referred to as an attenuator.

Hotta discloses in Figures 1 and 2 the use of a "drive-level adjuster" i.e. attenuator 2 provided at the input of the power amplifier so as to correct for errors in output power dependent upon the input employed and the operation characteristics of the power amplifier.

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide Dent with an attenuator and control that attenuator so as to correct for errors in output power as taught by Hotta.

Response to Arguments

Applicant's arguments filed 12-4-2002 and 5-18-2003 have been fully considered but they are not persuasive. Specially, applicant's argument that the prior art does not show an "output network" that contains no mechanically adjustable elements is respectfully disagreed with. In particular not the Dent reference as applied above.

Allowable Subject Matter